CLAIMS:

Having described the preferred embodiments, the invention is now claimed to be:

1. A CT scanner (10), comprising:

a means (14) for rotating a radiation source (20) around an examination region (16);

a means (40, 42) for generating an analog data signal that varies with an intensity of radiation traversing the examination region;

a means (56) for converting the analog data signal to a digital data signal including aperiodic pulses varying in frequency with the intensity of the radiation traversing the examination region as the radiation source rotates about the examination region;

a means (44, 58) for producing a time signal indicative of data intervals;

a means (62) for determining average radiation intensity in each data interval by counting the pulses of the digital data signal starting with a digital data signal pulse occurring in a preceding data interval and continuing to a digital data signal pulse occurring in a succeeding data interval.

2. The CT scanner as set forth in claim 1, the time signal producing means (44, 58) further including:

a means (80) for detecting a start of a first measured data interval and a start of a next data interval.

3. The CT scanner as set forth in claim 2, the determining means (62) further including:

a means (60) for storing a first digital data signal pulse count in a first start data location (88) and storing a first time signal value associated with the first digital data signal pulse count in a first start time location (96) each time a pulse occurs on the digital data signal until the first measured data interval starts and for storing a second digital data signal pulse count in an end data location (94) and storing a second time signal value associated with the second digital data signal pulse count in an end time location (102)

when the next pulse occurs on the digital data signal after the start of the next data interval is detected;

wherein the determining means (62) determines the average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the end data location and the pulse count stored in the first start data location by a difference between the value stored in the end time location and the value stored in the first start time location.

4. The CT scanner as set forth in claim 3 the converting means (56) further including:

a means (66, 68, 70) for adding a minimized offset signal to the analog data signal so that the intensity of the analog data signal is such that at least one aperiodic pulse occurs on the digital data signal during each data interval;

wherein the determining means (62) considers the minimized offset signal when determining the average intensity.

5. The CT scanner as set forth in claim 1, the converting means (70) further including:

a means (66, 68) for adding a minimized offset signal to the analog data signal prior to the converting so that the intensity of the analog data signal is such that at least one aperiodic pulse occurs on the digital data signal every 2-1/2 data intervals.

6. A method of measuring an intensity of detected radiation in a CT scanner, the method comprising:

a) rotating a radiation source around an examination region;

b) generating an analog data signal that varies with an intensity of radiation traversing the examination region;

c) converting the analog data signal to a digital data signal including aperiodic pulses varying in frequency with the intensity of the radiation traversing the examination region as the radiation source rotates about the examination region;

d) producing a time signal indicative of data intervals;

e) determining average radiation intensity in each data interval by counting the

pulses of the digital data signal starting with a digital data signal pulse occurring in a preceding data interval and continuing to a digital data signal pulse occurring in a succeeding data interval.

7. The method as set forth in claim 6 wherein step e) further includes:

f) storing a first digital data signal pulse count in a first start data location and storing a first time signal value in a first start time location each time a pulse occurs on the digital data signal until a first measured data interval starts;

g) detecting a start of the first measured data interval and detecting a start of a next data interval;

h) after the start of the next data interval is detected, storing a second digital data signal pulse count in an end data location and storing a second time signal value in an end time location when the next pulse occurs on the digital data signal; and

i) determining an average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the end data location and the pulse count stored in the first start data location by a difference between the value stored in the end time location and the value stored in the first start time location.

8. The method as set forth in claim 7, further including:

in step c), adding a minimized offset signal to the analog data signal prior to the converting so that the intensity of the analog data signal is such that at least one aperiodic pulse occurs on the digital data signal during each data interval; and

in step i), considering the minimized offset signal when determining the average intensity.

9. The method as set forth in claim 7, further including:

in step a), adding a minimized offset signal to the analog data signal prior to the converting so that the intensity of the analog data signal is such that at least one aperiodic pulse occurs on the digital data signal every 2-1/2 data intervals;

in step f), continuing to store the digital data signal pulse count in the same manner until the start of a second data interval;

in step g), detecting a start of the second measured data interval between the start of

the first measured data interval and the start of the next data interval; and

in step i), determining the average intensity for the second measured data interval rather than the first measured data interval and considering the minimized offset signal when determining the average intensity.

10. The method as set forth in claim 6 wherein:

in step c), adding a minimized offset signal to the analog data signal prior to the converting so that the intensity of the analog data signal is such that at least one aperiodic pulse occurs on the digital data signal every 2-1/2 data intervals.

11. The method as set forth in claim 10 wherein step e) further includes:

f) storing a first digital data signal pulse count in a first start data location and storing a first time signal value in a first start time location each time a pulse occurs on the digital data signal during first and second preceding data intervals until a first measured data interval starts, wherein the first preceding data interval is adjacent to the first measured data interval and the second preceding data interval is adjacent to the first preceding data interval.

12. The method as set forth in claim 11 wherein step e) further includes:

g) detecting a start of the first measured data interval and detecting a start of a first succeeding data interval adjacent to the first measured data interval;

h) after the start of the first succeeding data interval is detected, storing a second digital data signal pulse count in a first end data location and storing a second time signal value in a first end time location when the next pulse occurs on the digital data signal during the first succeeding data interval; and

i) determining an average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the first end data location and the pulse count stored in the first start data location by a difference between the value stored in the first end time location and the value stored in the first start time location.

13. The method as set forth in claim 11 wherein step e) further includes:

g) detecting a start of the first measured data interval, detecting a start of a first succeeding data interval adjacent to the first measured data interval, and detecting a start of a second succeeding data interval adjacent to the first succeeding data interval;

h) after the start of the second succeeding data interval is detected, storing a second digital data signal pulse count in a first end data location and storing a second time signal value in a first end time location when the next pulse occurs on the digital data signal during the second succeeding data interval; and

i) determining an average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the first end data location and the pulse count stored in the first start data location by a difference between the value stored in the first end time location and the value stored in the first start time location.

14. The method as set forth in claim 11 wherein step e) further includes:

g) detecting a start of the first measured data interval and detecting a start of a first succeeding data interval adjacent to the first measured data interval;

h) when the start of the first succeeding data interval is detected, storing a second digital data signal pulse count in a first end data location and storing a second time signal value in a first end time location; and

i) determining an average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the first end data location and the pulse count stored in the first start data location by a difference between the value stored in the first end time location and the value stored in the first start time location.

15. The method as set forth in claim 14 wherein:

the first succeeding data interval is a second measured data interval; and

step e) further including:

j) storing a third digital data signal pulse count in a second start data location and storing a third time signal value in a second start time location each time a pulse occurs on the digital data signal during first and second preceding data intervals with respect to the second measured data interval until the second measured data interval starts, wherein the

first preceding data interval is adjacent to the second measured data interval and the second preceding data interval is adjacent to the first preceding data interval;

wherein step e) further includes:

k) detecting a start of the second measured data interval and detecting a start of first and second succeeding data intervals with respect to the second measured data interval, wherein the first succeeding data interval is adjacent to the first measured data interval, wherein the second succeeding data interval is adjacent to the first succeeding data interval;

l) after the start of the second succeeding data interval is detected, storing a fourth digital data signal pulse count in a second end data location and storing a fourth time signal value in a second end time location when the next pulse occurs on the digital data signal during the second succeeding data interval; and

m) determining an average intensity of the detected radiation for the second measured data interval by dividing a difference between the pulse count stored in the second end data location and the pulse count stored in the second start data location by a difference between the value stored in the second end time location and the value stored in the second start time location.

16. The method as set forth in claim 10 wherein step e) further includes:

f) detecting a start of the first measured data interval;

g) when the start of the first measured data interval is detected, storing a first digital data signal pulse count in a first start data location and storing a first time signal value in a first start time location.

17. The method as set forth in claim 16 wherein step e) further includes:

h) detecting a start of a first succeeding data interval adjacent to the first measured data interval;

i) after the start of the first succeeding data interval is detected, storing a second digital data signal pulse count in a first end data location and storing a second time signal value in a first end time location when the next pulse occurs on the digital data signal during the first succeeding data interval; and

j) determining an average intensity of the detected radiation for the first measured

data interval by dividing a difference between the pulse count stored in the first end data location and the pulse count stored in the first start data location by a difference between the value stored in the first end time location and the value stored in the first start time location.

18. The method as set forth in claim 17 wherein:

the first succeeding data interval is a second measured data interval; and

step e) further including:

k) storing a third digital data signal pulse count in a second start data location and storing a third time signal value in a second start time location each time a pulse occurs on the digital data signal during first and second preceding data intervals with respect to the second measured data interval until the second measured data interval starts, wherein the first preceding data interval is adjacent to the second measured data interval and the second preceding data interval is adjacent to the first preceding data interval;

wherein step e) further includes:

l) detecting a start of the second measured data interval and detecting a start of a first succeeding data interval with respect to the second measured data interval, wherein the first succeeding data interval is adjacent to the second measured data interval;

m) when the start of the first succeeding data interval is detected, storing a fourth digital data signal pulse count in a second end data location and storing a fourth time signal value in a second end time location; and

n) determining an average intensity of the detected radiation for the second measured data interval by dividing a difference between the pulse count stored in the second end data location and the pulse count stored in the second start data location by a difference between the value stored in the second end time location and the value stored in the second start time location.

19. The method as set forth in claim 16 wherein step e) further includes:

h) detecting a start of the first measured data interval, detecting a start of a first succeeding data interval adjacent to the first measured data interval, and detecting a start of a second succeeding data interval adjacent to the first succeeding data interval;

i) after the start of the second data interval is detected, storing a second digital data

signal pulse count in a first end data location and storing a second time signal value in a first end time location when the next pulse occurs on the digital data signal during the second succeeding data interval; and

j) determining an average intensity of the detected radiation for the first measured data interval by dividing a difference between the pulse count stored in the first end data location and the pulse count stored in the first start data location by a difference between the value stored in the first end time location and the value stored in the first start time location.

20. The method as set forth in claim 19 wherein:

the first succeeding data interval is a second measured data interval; and

step e) further including:

k) storing a third digital data signal pulse count in a second start data location and storing a third time signal value in a second start time location each time a pulse occurs on the digital data signal during first and second preceding data intervals with respect to the second measured data interval until the second measured data interval starts, wherein the first preceding data interval is adjacent to the second measured data interval and the second preceding data interval is adjacent to the first preceding data interval;

wherein step e) further includes:

l) detecting a start of the second measured data interval and detecting a start of a first succeeding data interval with respect to the second measured data interval, wherein the first succeeding data interval is adjacent to the second measured data interval;

m) after the start of the first succeeding data interval is detected, storing a fourth digital data signal pulse count in a second end data location and storing a fourth time signal value in a second end time location when the next pulse occurs on the digital data signal during the first succeeding data interval; and

n) determining an average intensity of the detected radiation for the second measured data interval by dividing a difference between the pulse count stored in the second end data location and the pulse count stored in the second start data location by a difference between the value stored in the second end time location and the value stored in the second start time location.